

What is claimed is:

1. A sensor for measuring a wavefront, said sensor comprising:

a plurality of mirrors for receiving the wavefront, said plurality of mirrors comprising a first mirror region for reflecting a first portion of the wavefront, said first mirror region having a first position to reflect in one direction and a second position to reflect in another direction;

an imaging device for detecting said first portion of the wavefront, said first mirror region directing said portion of the wavefront to be received by said imaging device when said first mirror region is in said first position, said first mirror region directing said portion of the wavefront so as not to be received by said imaging device when said first mirror region is in said second position; and

a processor for controlling the movement of said first mirror region between said first and second positions.

2. A sensor in accordance with claim 1, wherein said plurality of mirrors further comprises a second mirror region for reflecting a second portion of the wavefront, said second mirror region having a first position and a second position; said second mirror region directing said second portion of the wavefront to be received by said imaging device when said second mirror region is in said first position, said second mirror region directing said second portion of the wavefront so as not to be received by said imaging device when said second mirror region is in said second position; and said processor controlling the movement of said second mirror region between said first and second positions.

3. A sensor in accordance with claim 2 wherein said first mirror region and said second mirror region each comprise at least one mirror.

4. A sensor in accordance with claim 2 wherein said processor is capable of receiving information from said imaging device for computing a first wave aberration for said first portion of the wavefront and a second wave aberration for said second portion of the wavefront.

5. A sensor in accordance with claim 4, wherein said processor is capable of positioning substantially simultaneously said first mirror region in said first position and said second mirror region in said first position, and computes said first and second wave aberration for said first and second portions of the wavefront.

6. A sensor in accordance with claim 2, wherein said first mirror region and said second mirror region are separated by a third mirror region for reflecting a third portion of the wavefront, said third mirror region having a first position wherein said third portion of the wavefront is directed to said imaging device and a second position wherein said third portion of the wavefront is directed so as not to be received by said imaging device.

7. A sensor in accordance with claim 6, wherein said third mirror region is in said second position when said first and second mirror regions are in said first position.

8. A sensor in accordance with claim 4, wherein said processor positions said first mirror region in said first position and said second mirror region in said first position at

different times for computing said first wave aberration and said second wave aberration for said first and second portions of the wavefront.

9. A sensor in accordance with claim 1 wherein said plurality of mirrors is provided by a digital micromirror device (DMD).

10. A sensor in accordance with claim 1 wherein said imaging device is a charge coupled device (CCD).

11. A sensor in accordance with claim 1, further comprising:
a redirecting mirror optically positioned between said reflecting device and said imaging device for reflecting said first portion of the wavefront from said reflecting device to said imaging device.

12. An apparatus for measuring aberrations of a point source image wavefront emitted from a focusing optical system, comprising:

a radiation source for generating a beam to be directed to the focusing optical system;
a plurality of mirrors for receiving the point source image wavefront from the focusing optical system, said plurality of mirrors comprising a first mirror region for reflecting a first portion of the point source image wavefront, said first mirror region having a first position and a second position;

an imaging device for receiving said first portion of the point source image wavefront, said first mirror region when in said first position directing said portion of the point source image wavefront to be received by said imaging device, said first mirror region when in said

second position directing said portion of the point source image wavefront so as not to be received by said imaging device; and

a processor for controlling the movement of said first mirror region between said first and second positions.

13. An apparatus in accordance with claim 12, wherein said plurality of mirrors further comprises a second mirror region for reflecting a second portion of the point source image wavefront, said second mirror region having a first position and a second position; said first position of said second mirror region directing said second portion of the point source image wavefront to be received by said imaging device, said second position of said second mirror region directing said second portion of the point source image wavefront so as not to be received by said imaging device; and said processor controlling the movement of said second mirror region between said first and second positions.

14. An apparatus in accordance with claim 12, further comprising:

a redirecting mirror optically positioned between said reflecting device and said imaging device for facilitating the placement of said imaging device in relation to said reflecting device.

15. An apparatus in accordance with claim 12, further comprising:

a fixation target; and

a beam splitter optically positioned between said radiation source and the focusing optical system for optically combining said fixation target with said beam.

16. A method for measuring an optical wavefront comprising the steps of:

- (a) reflecting a selected portion of the optical wavefront onto an imaging device;
- (b) reflecting another selected portion of the optical wavefront onto said imaging device; and
- (c) capturing information related to each of the selected portions of the optical wavefront for computing the aberration of each of the selected portions.

17. A method in accordance with claim 16, further comprising the step of:

analyzing the captured information to determine the aberration of each of the selected portions.

18. A method in accordance with claim 16, further comprising the step of:

repeating steps (b) and (c) until information related to a desired region of said optical wavefront is captured.

19. A method in accordance with claim 18, further comprising the step of:

computing the aberration of said desired region.

20. A method for measuring an optical wavefront comprising the steps of:

reflecting each of a plurality of portions of the optical wavefront onto an imaging device; and

determining aberrations of the optical wavefront.

21. A method in accordance with claim 20, wherein said determining step comprises:

comparing an image produced on said image device by the optical wavefront with a known value for an aberration free wavefront for each of said plurality of portions of the optical wavefront;

calculating individual aberrations for each of said plurality of portions of the optical wavefront; and

combining the individual aberrations to derive the optical wavefront aberrations.

22. A method for measuring wave aberrations of a focusing optical system comprising:

generating a spot on a reflective surface within the focusing optical system;

reflecting each of a plurality of portions of a point source image emitted from the focusing optical system onto an imaging device; and

determining wave aberrations of the focusing optical system.

23. A method in accordance with claim 22, wherein said determining step comprises:

comparing an image produced on said imaging device by said point source image with a known value for an aberration free image for each of said plurality of portions;

calculating individual aberrations for each of said plurality of portions; and

combining the individual aberration to derive the focusing optical system aberrations.

24. A method in accordance with claim 23, wherein said point source image corresponds to said spot on said reflective surface.

25. A method in accordance with claim 21, further comprising the steps of:

generating a fixation target; and

passing said fixation target to said focusing optical system.

26. A method for determining wave aberrations of an eye comprising the steps of:

generating a beam;

passing said beam to a spot on a retina of the eye;

passing a wavefront corresponding to said spot on said retina emanating from said eye
to a multi-mirror device; and

selectively reflecting portions of said wavefront incident on said multi-mirror device
to an imaging device.

27. A method in accordance with claim 26, further comprising the steps of:

generating a fixation target; and

passing said fixation target to said eye.

28. A method in accordance with claim 26, further comprising the steps of:

comparing the selectively reflected portions of said wavefront on said imaging device
with a known value for an aberration free image; and

determining wave aberrations of said eye using the compared selectively reflected
portions of said wavefront.